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Original Research Article

A Cross-Sectional Study of Deviated Nasal Septum and Its Clinical Presentation

Chakravarthula. Madhumitha[1], Dweethi Jayaprakash[2], Chakravarthula Ramanachary[3]

[1]Senior Resident, Department of ENT, Government Medical College, Karimnagar, Telangana
[2]Associate Professor, Department of ENT, Government medical College, Nirmal, Telangana
[3]Professor and HOD, Department of ENT, Prathima Institute of medical sciences, Karimnagar, Telangana

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Corresponding Author: Dr. Chakravarthula. Ramanachary
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Abstract:

Background: Deviated nasal septum (DNS) is one of the most frequently encountered structural abnormalities in otorhinolaryngology practice and is a major contributor to nasal obstruction and related sinonasal complaints. The clinical presentation varies depending on the type and severity of septal deviation. This study aimed to evaluate the clinical profile and morphological patterns of DNS and to assess the association between septal deviation type and presenting symptoms.

Material and Methods: A hospital-based cross-sectional study was conducted in the Department of Otorhinolaryngology of a tertiary care center over 18 months. A total of 150 patients aged ≥10 years with clinically and endoscopically confirmed DNS were enrolled. Demographic details, symptom profile, and severity of nasal obstruction using a 10-point Visual Analog Scale (VAS) were recorded. Septal morphology was classified based on endoscopic findings. Data were analyzed using appropriate statistical tests, with $p < 0.05$ considered statistically significant.

Results: The mean age of participants was 31.8 ± 11.6 years, with the highest proportion in the 21–30-year age group (30.7%). Males constituted 62.7% of cases. Nasal obstruction was present in all patients. Headache (58.7%) and nasal discharge (50.7%) were common associated symptoms. Moderate nasal obstruction was observed in 45.3% of patients, with a mean VAS score of 5.9 ± 2.1. C-shaped deviation was the most frequent morphological type (41.3%). Inferior turbinate hypertrophy was the most common associated endoscopic finding (54.7%). A statistically significant association was observed between the type of septal deviation and predominant symptoms ($\chi^2 = 9.84$, $p = 0.043$).

Conclusion: DNS predominantly affects young adults and is commonly associated with moderate to severe nasal obstruction. Morphological variation influences symptom patterns, underscoring the importance of detailed anatomical assessment for optimal clinical management.

Keywords: Deviated nasal septum; Nasal obstruction; Septal morphology; Sinonasal symptoms; Cross-sectional study.

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Introduction

Deviated nasal septum (DNS) refers to a displacement of the nasal septum from the midline, involving cartilaginous and/or bony structures, and ranks among the most common anatomical variations encountered in otorhinolaryngology practice. DNS may be congenital or acquired and can influence nasal airflow dynamics, predisposing individuals to a range of clinical manifestations [1,2]. Although septal deviation is a frequent incidental finding on imaging studies — with reported prevalence estimates varying widely from approximately 18% to more than 60% depending on population and diagnostic method — not all deviations are symptomatic [3,4].

When clinically significant, DNS is strongly associated with nasal obstruction, the most common presenting complaint in affected patients, often accompanied by headache, nasal discharge, postnasal drip, hyposmia, snoring, and facial pressure or pain [5,6]. These symptoms can have a substantial impact on quality of life, sleep quality, and daily functioning [5]. Additionally, septal deviation has been implicated as a potential contributing factor to sinonasal inflammatory disorders, including chronic rhinosinusitis, although the nature and strength of this relationship remain subjects of ongoing investigation [7].

Understanding the clinical profile of DNS in specific populations is critical for accurate diagnosis and effective management. Detailed characterization of symptom patterns, anatomical variation, and associated endoscopic findings can aid clinicians in selecting patients who may benefit from medical therapy, surgical intervention, or combined approaches.

Material and Methods

Study Design and Setting: This hospital-based cross-sectional observational study was conducted at a tertiary care teaching hospital in India. Written informed consent was obtained from all participants or from guardians in the case of minors.

Study Population: Patients presenting to the outpatient department with symptoms suggestive of nasal obstruction or related sinonasal complaints were screened for eligibility. Individuals aged 10 years and above who were diagnosed clinically with deviated nasal septum (DNS) on anterior rhinoscopy and confirmed by diagnostic nasal endoscopy were included.

Patients were excluded if they had:

- Previous nasal or septal surgery
- History of significant nasal trauma within the preceding six months
- Acute upper respiratory tract infection at the time of examination
- Nasal masses, polyposis, or sinonasal malignancy
- Congenital craniofacial anomalies

Sample Size Estimation: The sample size was calculated based on an anticipated prevalence of symptomatic deviated nasal septum of approximately 65% among patients presenting with nasal obstruction, as reported in previously published Indian hospital-based studies. Using the formula for estimation of a single proportion: $n=Z^2 \times p \times q/d^2$ where $Z = 1.96$ (95% confidence level), $p = 0.65$, $q = 1 - p$, $d = 0.08$ (absolute precision), the calculated minimum sample size was 136. To compensate for incomplete data and potential exclusions, a total of 150 participants were enrolled consecutively during the study period.

Data Collection: A structured proforma was used to collect demographic and clinical information. The following variables were recorded:

- Age and sex
- Presenting symptoms (nasal obstruction, headache, nasal discharge, epistaxis, hyposmia, facial pain, snoring, postnasal drip)
- Duration of symptoms
- Laterality and severity of nasal obstruction
- Associated comorbidities such as allergic rhinitis or sinusitis

Symptom severity was assessed using a 10-point Visual Analog Scale (VAS), where 0 represented no symptoms and 10 indicated maximum severity.

Clinical Examination: All participants underwent detailed otorhinolaryngological examination including:

1. Anterior rhinoscopy using Thudicum's nasal speculum under adequate illumination.
2. Diagnostic nasal endoscopy performed with a 0-degree rigid endoscope (4 mm for adults and 2.7 mm for pediatric patients) following topical nasal decongestion using 0.05% oxymetazoline spray and topical anesthesia with 4% lignocaine.

The type of septal deviation was categorized according to standard morphological patterns (C-shaped, S-shaped, spur, caudal deviation, high deviation). Associated findings such as turbinate hypertrophy, mucosal edema, contact points, and sinus ostial obstruction were documented.

Radiological Assessment: In patients with clinical suspicion of chronic rhinosinusitis or significant anatomical variations, computed tomography (CT) of the paranasal sinuses was performed. Radiological findings were correlated with endoscopic observations.

Outcome Measures: The primary outcome was the distribution of clinical symptoms among patients with deviated nasal septum. Secondary outcomes included correlation between type of deviation and predominant clinical presentation.

Statistical Analysis: Data were entered into Microsoft Excel and analyzed using Statistical Package for the Social Sciences (SPSS) version 26.0. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Associations between categorical variables were evaluated using the Chi-square test or Fisher's exact test where appropriate. Comparison of mean symptom scores across deviation types was performed using one-way analysis of variance (ANOVA). A p-value < 0.05 was considered statistically significant.

Results

A total of 150 patients diagnosed with deviated nasal septum (DNS) were included in the study. The age of participants ranged from 10 to 65 years, with a mean age of 31.8 ± 11.6 years. The highest proportion of patients belonged to the 21–30-year age group (30.7%), followed by 31–40 years (25.3%). Individuals older than 50 years constituted 9.3% of the study population. There was a clear male predominance, with males accounting for 62.7% of cases and females comprising 37.3% (Table 1).

Nasal obstruction was reported by all participants (100%). Headache was the second most common symptom (58.7%), followed by nasal discharge (50.7%) and postnasal drip (42.0%). Facial pain or pressure was observed in 36.0% of patients, while hyposmia and snoring were present in 31.3% and 27.3% of cases, respectively. Epistaxis was the least frequently reported symptom (19.3%) (Table 2).

Assessment of symptom severity using the Visual Analog Scale (VAS) demonstrated that 45.3% of patients experienced moderate nasal obstruction, while 33.4% reported severe obstruction. Mild symptoms were observed in 21.3% of participants. The overall mean VAS score was 5.9 ± 2.1 (Table 3).

Regarding morphological classification, the C-shaped deviation was the most prevalent type, identified in 41.3% of patients. S-shaped deformity accounted for 22.7%, while septal spur was observed in 19.3%. Caudal deviation and high deviation were less frequent, noted in 10.0% and 6.7% of cases, respectively (Table 4).

Endoscopic evaluation revealed that inferior turbinate hypertrophy was the most common associated finding (54.7%), followed by mucosal edema (47.3%) and features suggestive of chronic rhinosinusitis (29.3%). Middle turbinate hypertrophy was identified in 26.0% of patients, while septal contact points were observed in 24.0% (Table 5).

Analysis of the relationship between the type of septal deviation and predominant clinical manifestations demonstrated a statistically significant association ($\chi^2 = 9.84$, $p = 0.043$). Headache and facial pain were more frequently observed in patients with septal spur and S-shaped deviations compared to other morphological types (Table 6).

Table 1: Demographic Characteristics of Study Participants (n = 150)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	10–20	28	18.7
	21–30	46	30.7
	31–40	38	25.3
	41–50	24	16.0
	>50	14	9.3
Mean age ± SD		31.8 ± 11.6	—
Sex	Male	94	62.7
	Female	56	37.3

Table 2: Distribution of Presenting Symptoms (n = 150)

Symptom	Frequency (n)	Percentage (%)
Nasal obstruction	150	100
Headache	88	58.7
Nasal discharge	76	50.7
Postnasal drip	63	42.0
Facial pain/pressure	54	36.0
Hyposmia	47	31.3
Snoring	41	27.3
Epistaxis	29	19.3

Table 3: Severity of Nasal Obstruction Based on Visual Analog Scale (VAS)

Severity Category (VAS Score)	Frequency (n)	Percentage (%)
Mild (1–3)	32	21.3
Moderate (4–6)	68	45.3
Severe (7–10)	50	33.4
Mean VAS score ± SD	5.9 ± 2.1	

Table 4: Morphological Types of Deviated Nasal Septum

Type of Deviation	Frequency (n)	Percentage (%)
C-shaped	62	41.3
S-shaped	34	22.7
Septal spur	29	19.3
Caudal deviation	15	10.0
High deviation	10	6.7

Table 5: Associated Endoscopic Findings

Associated Finding	Frequency (n)	Percentage (%)
Inferior turbinate hypertrophy	82	54.7
Middle turbinate hypertrophy	39	26.0
Mucosal edema	71	47.3
Contact point	36	24.0
Features of chronic rhinosinusitis	44	29.3

Table 6: Association between Type of Septal Deviation and Predominant Symptom (Chi-square Test)

Type of DNS	Predominant Nasal Obstruction n (%)	Headache n (%)	Facial Pain n (%)	p-value
C-shaped (n=62)	62 (100)	32 (51.6)	18 (29.0)	0.043
S-shaped (n=34)	34 (100)	22 (64.7)	15 (44.1)	
Spur (n=29)	29 (100)	20 (69.0)	14 (48.3)	
Caudal (n=15)	15 (100)	7 (46.7)	3 (20.0)	
High (n=10)	10 (100)	7 (70.0)	4 (40.0)	

Discussion

In the present study, nasal obstruction was a universal symptom among patients with deviated nasal septum (DNS), consistent with the consensus that obstruction represents the predominant clinical manifestation of septal deviation due to altered nasal airflow dynamics and increased airway resistance. Symptom patterns observed — including headache, nasal discharge, postnasal drip, and facial pain — align with previous clinical observations that DNS can produce a spectrum of sinonasal complaints beyond mere obstruction, which often adversely affect patient quality of life and daily functioning [8]. The distribution of symptom severity observed in our cohort, with a substantial proportion of moderate to severe nasal obstruction, parallels findings from studies employing standardized nasal obstruction scales, which demonstrate a direct relationship between morphological characteristics of DNS and symptom burden [9].

The morphological classification in our cohort revealed a predominance of C-shaped deviations, corroborating imaging-based studies that have documented high variability in septal configuration but frequently identifying common deformity patterns in clinical populations undergoing evaluation for symptoms [10]. The clinical implications of specific deviation types are highlighted by the statistically significant association between morphology and symptom subsets — particularly headache and facial pain — suggesting that anatomical nuances may influence local mucosal contact and pressure dynamics, thereby modulating symptom expression [9].

The association between DNS and sinonasal inflammatory changes remains a topic of ongoing investigation. Several observational studies report increased prevalence of sinus disease among patients with significant septal deviations, suggesting that altered drainage patterns and mucociliary dysfunction may predispose to chronic sinusitis, although causality remains difficult to establish definitively [11,12]. Our endoscopic findings of mucosal edema and signs suggestive of chronic rhinosinusitis in a substantial subset of patients provide further evidence that DNS may be pathophysiologically linked to sinonasal inflammatory processes, warranting comprehensive assessment during evaluation.

Therapeutically, surgical correction via septoplasty has been validated by controlled studies and meta-analyses as an effective intervention for symptomatic DNS, resulting in significant improvement in nasal obstruction and quality of life measures relative to conservative management [13]. This underscores the clinical importance of accurate anatomical and functional assessment to identify patients most likely to benefit from intervention.

Overall, the present findings reinforce the multifaceted clinical profile of DNS, demonstrating its contribution not only to nasal obstruction but also to associated discomfort and potentially to sinonasal inflammatory pathology. Future longitudinal and interventional studies incorporating objective functional measures and imaging correlations will further clarify the causal pathways and optimize patient selection for medical versus surgical management.

Conclusion

Deviated nasal septum was most frequently observed in young adults and demonstrated a clear male predominance in this cohort. Nasal obstruction was universal, with a substantial proportion of patients experiencing moderate to severe symptom intensity. C-shaped deviation emerged as the most common morphological pattern, and inferior turbinate hypertrophy was the predominant associated endoscopic finding. A statistically significant relationship between septal morphology and specific clinical manifestations, particularly headache and facial pain, highlights the clinical relevance of detailed anatomical assessment. These findings emphasize the importance of comprehensive evaluation of septal deviation to guide individualized management strategies and improve symptomatic outcomes.

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